

PDP 4

COMPUTER APPLICATION NOTE

KEYDATA ON LINE FACILITY
HANDLES BUSINESS
APPLICATIONS

A U.S. District Court decision establishing a fund to settle a stockholders' suit created an unprecedented problem: How do you log and acknowledge correspondence, verify eligibility, determine losses, and compute compensations from a \$5,300,000 fund with from 50,000 to 100,000 claims expected?

One approach would be to establish an organization staffed by attorneys to process all the applications, since a major demand is that each document in each claim must satisfy detailed legal specifications. The complexity of the problem ruled out the possibility of clerks performing the evaluation under the supervision of an attorney. Instead, the solution devised by Keydata Corporation of Boston was selected.

Keydata's approach was to use an on-line data acquisition and processing facility based on Digital's general-purpose Programmed Data Processor-4 computer, a Data Communication System and seven Keydata Teleprinter input-output stations, and an extensive Micro Tape subsystem. Following procedures approved by the court, the Keydata system performs the sorting, searching, recording, acknowledging, and evaluation functions necessary to insure that each claim satisfies the many rules defining eligibility. The system is designed to insure strict adherence to the court-approved settlement plan and to minimize human intervention and errors. The storage consideration was critical, since more than 75,000 transactions are involved.

And since Keydata designed the system and its software for general-purpose use, it will be able to perform several different types of business and scientific data processing assignments.

Keydata is a division of Charles W. Adams Associates Incorporated of Bedford, Mass., electronic data processing consultants. Keydata was named an assistant special master by the court when the fund was established to pay claims of investors in a firm whose stock price had slumped.

Administration of the fund is a three-step process:

1. logging, acknowledging, and accounting for applications sent in by stockholders and former stockholders
2. examining each claim in detail, verifying it according to thorough procedures established by the court-appointed master
3. computation of individual losses, determination of awards, court approval, and distribution

In phase one, operators at the seven on-line Keydata stations logged each claim by typing in the claimant identification and information. The system responded by accounting for control and filing numbers that had been assigned to each claim. In addition, standard format, field, and consistency checking was done in real time, thereby providing dynamic control of the acquired data. Each day, after all new claims had been logged and stored on tape, the computer:

1. Searched prior tapes for previous claimant information
2. Typed a letter to each new claimant acknowledging his application
3. Provided statistical analyses of claimant information for review by the court
4. Sorted all names and addresses into alphabetical order for a compilation of all claimant information
5. Printed an alphabetical index to the chronologically filed claim folders.

This operation continued five and a half months.

The second phase, processing and evaluating in detail each transaction to insure that it conforms to the court-approved specifications, is expected to be completed after some seven months of work. In this step, an operator at a Keydata station calls up a transaction from Micro Tape by its file number for an extensive testing of its form and content. When the project began, 37 rules were established to determine the eligibility of the claim. Midway through step 2, the number had reached 150, as a better understanding of the problems was achieved. Keydata officials expect the ultimate number of rules governing eligibility to approach 200.

To help the Keydata operators perform this function, a 30-question check list based on the eligibility rules was developed. Clerks compare the filed records constituting the claim record against the check list, then post the results on Micro Tape. The computer later evaluates each claim on the basis of the check list, rejects those which fall beyond the gross limits, and indicates what amendments are required to those which are not completely correct in form but are still apparently eligible. Again, the computer types out, after evaluation operations are completed for the day, the necessary letters to tell each claimant that his eligibility has been established, that he must file additional specified information, or that his claim has been rejected.

Some of the questions on the check list are given below.

1. . . . is the name (of the applicant) the same . . . ?
 - 1a. (to be answered if the answer to 1. was NO) Was the change made to correct spelling only?
 - 1b. (to be answered by a special reviewer if the answer to 1a. was NO) What rule covers the name change in this case?
2. Does the name on the application compare with the name on each supporting document?
 - 2a. (to be answered if the answer to 2. was NO) Has every person whose name appears as an applicant on the form and every person whose name appears on a supporting document signed the application on the back of the form?
3. Is there a legible purchase confirmation with the application?

- 3a. (to be answered if the answer to 3. was NO) Is there a legible broker's statement supporting the purchase in that it shows date of purchase and purchase price?
- 3b. (to be answered by the special reviewer if the answer to 3a. was NO) What rule covers the lack of a purchase confirmation?

Other questions cover ownership, whether individual or corporate, disposition, securities dealer involved in the disposition, date of transaction, the presence of signatures and oath, the legibility of the information in the notary public's stamp, and the presence of a notary's seal on the application.

The final step in the process will begin after all information has been gathered and verified. Its aim will be to determine the exact amount to be paid to each claimant based on his approved, recognized loss. This operation, including the complex calculation required to allocate the \$5,300,000 in the fund equitably among those eligible, will also be carried out by the system. After the court approves the proposed settlement, those eligible will be told, in letters typed by the system, what their awards will be, and the ineligible applicants will be notified that their claims have been disallowed. An appeal period will be set aside before actual disbursement begins. As the final operation, the Keydata system will make out the settlement checks on the 300 lines-per-minute printer.

Basic to the Keydata concept is the on-line data input-output stations, where Teleprinter keyboards feed data directly into the computer. Other approaches, such as punching the data from the applications and supporting documents on cards or paper tape for later input, would have resulted in far more error. Keydata determined, for example, that data input error percentages run as high as 10 per cent for card systems.

The continuous format checking permitted by the on-line system held unverified input errors initially to less

than 1 per cent. Further refinements in format testing indicated a possible further reduction to less than $\frac{1}{2}$ of 1 per cent.

A further disadvantage of the off-line input approach is the time delay between preparing and testing inputs. With a card system, cards might be prepared one day, verified the second, and fed into the computer for format checking on the third. By the time format errors were detected, the documents needed to correct faulty cards would have been filed away, leading to time lost in retrieval. With the Keydata system, however, the computer checks the input data continuously and notifies the operator immediately when an error has been made. The data needed is still at hand, and the erroneous entry is corrected without delay.

Other uses being considered for the Keydata system are in business data processing and information storage and retrieval. The business application includes scheduling, ordering and billing, inventory control, customer account status and credit aging reports, and payroll preparation for from 32 to 48 clients. Users will send data to the system and get their results back on private lines at their facilities. This represents a significant departure from normal batch processing techniques.

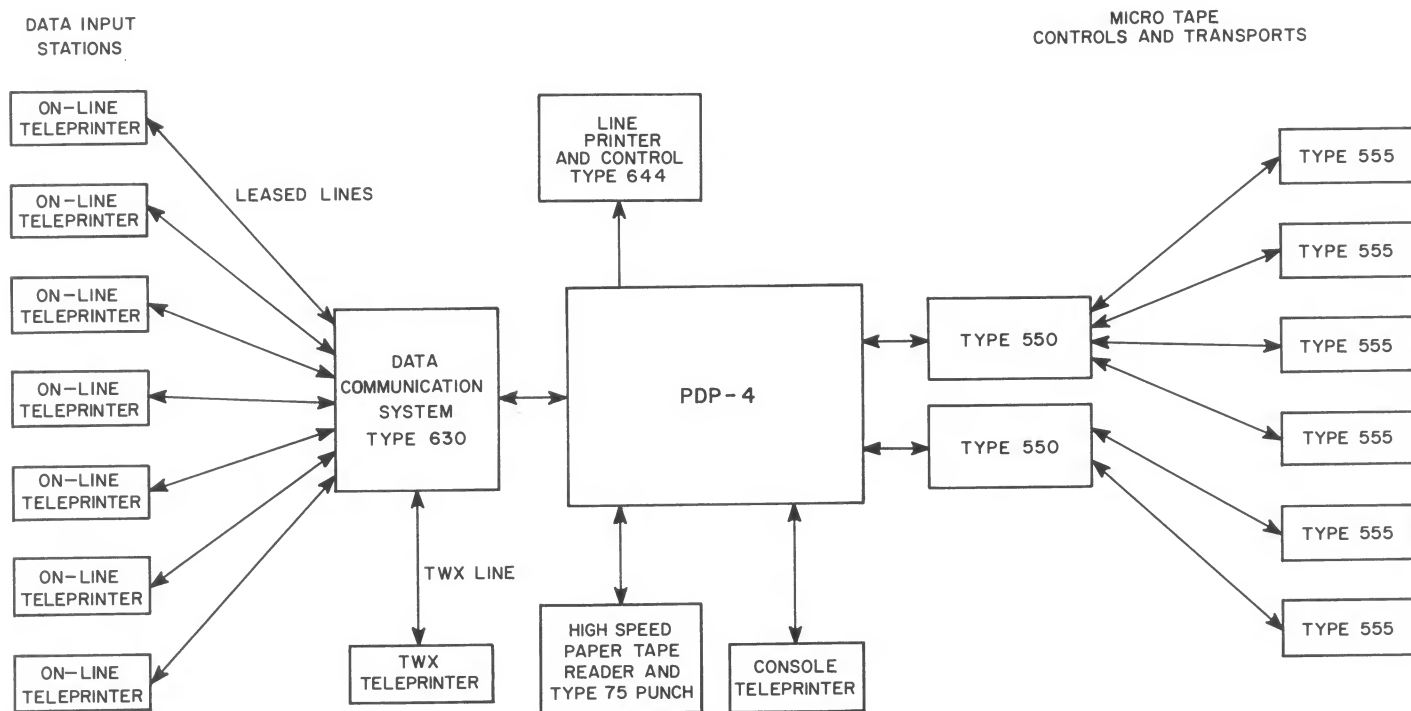
In addition to the leased lines, TWX facilities would be available. This service would permit users anywhere in the country to dial the Keydata computer number, TWX in their data, and get their results back on TWX. A user could insert the proper forms in his machine, whether blank checks, inventory or scheduling reports, or ordering sheets, and have the system print them right in his office. Control information in the system would not permit him to use services to which he had not subscribed, and other safeguards would keep his records unavailable to other users. The only equipment he would need would be the TWX machine, which he could continue to use for other purposes when he wasn't calling for computer service.



Keydata's on-line teleprinter input-output stations feed data directly into the PDP-4 computer, reducing input errors through continuous format checking and eliminating the delays associated with card input systems. TWX facilities are also available for remote input and output.



Shown at the operator's console of the Keydata PDP-4 are Charles W. Adams, seated, president of Charles W. Adams Associates Inc., Keydata's parent firm, and Harlan E. Anderson, Digital vice president.



In a recent feasibility demonstration, the system performed a data collection and processing function for automating retrieval from a file of coded information of part of one million reports covering the results of 15 million experiments in food preparation, packaging, and storage. The laboratory had considered going to punched cards, but Keydata was able to demonstrate a 50 to 75 per cent reduction in the cost of data preparation with the on-line system.

Again, the system demonstrated a significant reduction in the number of errors that would occur in punching the data onto cards. The storage problem with a card input system would also be critical, since each of the million reports to be filed might require as many as 100 cards, two for the report itself and four for each of up to 25 experiments covered by the report.

Digital's Micro Tape gives the Keydata system unusual convenience, reliability, and flexibility. It offers the programmer or operator a fast input-output device which eliminates the normal delays associated with paper tape and punched cards. Significant features of its design are redundant data tracks, phase — rather than amplitude — recording, and a permanent timing track. Micro Tape's advantages also include economy: the six dual transports and two controls in the Keydata system cost less than two conventional magnetic tape transports and a control.

A principal benefit for Keydata in using Micro Tape is that it gives the installation the data storage unit most appropriate to the size of the "pieces" of data being handled. One Keydata input station, for example, can work all day on a single tape reel without filling it,

permitting a semipermanent allocation of tape drive to in/out station. Intermittent users can call for their own reels and be on line in from 15 to 30 seconds on the nonallocated drives.

The 12 individual transports give the system a many-bin capability to perform the sophisticated sorting operations required by the fund settlement project. This capability telescopes the steps that would be required for the same results in a two- or three-transport conventional tape installation. Contributing to the installation's sorting capability is its short search time, virtually a "quasi-random" access. Short search times result from the small (4-inch) reel, bidirectional reading and writing, and the ability to rewrite a section of a word in the middle of a block without having to rewrite the whole block to make the change.

Programmed Data Processor-4, heart of the Keydata system, was developed for use as a complete computer or as the control element in information processing systems. It is a single-address, binary computer operating in parallel on 18-bit words with 1's or 2's complement arithmetic. Core memory, with a cycle time of 8 microseconds, can range from 1024 to 32,768 words. The computation rate is 62,500 additions a section. A powerful input-output interface was a primary goal in its design, resulting in a real-time control feature that enables the machine to operate efficiently at data rates varying from one word in several seconds to 125,000 words in one second. PDP-4 can work with many types of input-output equipment simultaneously, and it offers a versatile array of programming aids, including FORTRAN II, Symbolic Assembly and Debugging System, and utility and maintenance routines.

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